In Situ Burning of Oil Spills: Resource Collection NIST Special Publication 995 Volume 2 rev 1



*** EACH PAPER IS TREATED LIKE A SEPARATE DOCUMENT AND MAY BE VIEWED OR DOWNLOADED THAT WAY ***

William D. Walton, Editor



National Institute of Standards and Technology Technology Administration U.S. Department of Commerce

In Situ Burning of Oil Spills: Resource Collection NIST Special Publication 995 Volume 2 rev 1



William D. Walton, Editor Building and Fire Research Laboratory National Institution of Standards and Technology Gaithersburg, MD 20899



Sponsored by:

U.S. Department of Interior Gale A. Norton, Secretary

MMS

Minerals Management Service R. M. Burton, Director

Joseph V. Mullin, Project Manager

March 2003 Revision 1 May 2003



U.S. Department of Commerce Donald D. Evans, Secretary

Technology Administration Phillip J. Bond, Under Secretary for Technology

> National Institute of Standards and Technology Arden L. Bement, Jr., Director

In Situ Burning of Oil Spills: Resource Collection NIST Special Publication 995 Volume 2 rev 1



Abstract:

The Minerals Management Service (MMS), U.S. Department of Interior, is designated as the lead agency for *in situ* burn research in the Oil Pollution Research and Technology Plan prepared under the authority of Title VII of the Oil Pollution Act of 1990 (OPA-90). In response to MMS's continuing effort to ensure the relevance of its research program to the needs of the user community, and as a result of widespread pre-approval of *in situ* burning and advances in the technology, MMS presents this collection of *in situ* burn resource materials. This collection was developed primarily to aid oil spill response professionals with knowledge and training in the use of *in situ* burning as a response tool. The collection provides a wealth of information in a convenient format that can be used in the planning, response or research environment. It contains more than 350 documents with over 13,000 pages and nearly one hour of video.

Key words: crude oil, environmental effects, fire research, in situ burning, oil spills



References

Bryner, N. P., Walton, W. D., DeLauter, L. A., Twilley, W. H., and Mullin, J. V., "Response of Portable Particulate Monitoring Instruments to Combustion Particulates, Road Dust, and Salt Aerosols," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 22nd. Volume 2. Proceedings. June 2-4, 1999, Calgary, Alberta, Canada, Environment Canada, Ottawa, Ontario, 519-544 PP, 1999. [Bryner_99]

Bryner, N. P., Walton, W. D., DeLauter, L. A., Twilley, W. H., Mendelssohn, I. A., Lin, Q., and Mullin, J. V., "In-Situ Burning in the Marshland Environment-Soil Temperatures," Environment Canada. Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 23rd., Volume 2. Proceedings. June 14-16, 2000, Vancouver, British Columbia, Canada, Environment Canada, Ottawa, Ontario, 823-846 PP, 2000. [Bryner_00]

Bryner, N. P., Walton, W. D., Twilley, W. H., Roadarmel, G., Mendelssohn, I. A., Lin, Q., and Mullin, J. V., "In-Situ Burning in the Marshland Environment - Soil Temperatures Resulting from Crude Oil and Diesel Fuel Burns," Environment Canada. Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 24th. Proceedings. June 12-14, 2001, Edmonton, Canada, Environment Canada, Ottawa, Ontario, 729-753 PP, 2001. [Bryner_01]

Bryner, N. P., Walton, W. D., Mendelssohn, I. A., Lin, Q., and Mullin, J. V. "Effects of In-Situ Oil Burning on Coastal Wetlands: Soil Temperatures and Regrowth of Marsh Plant Species" Proceedings of the 2003 Oil Spill Conference, API publication No. 14730, American Petroleum Institute, Washington, D.C., 1-8 pp, 2003. [Bryner_03]

Dutta, P., Sivathanu, Y. R. and Gore, J. P., An Investigation of Oil and Gas Well Fires and Flares, National Institute of Standards and Technology, Gaithersburg, MD, NIST-GCR-94-653, 68 p., 1994. [Dutta_94]

Evans, D. and Pfenning, D., "Water sprays Suppress Gas-well Blowout Fires," Oil and Gas Journal, April 29, 80-86 pp., 1985. [Evans 85]

Evans, D., Baum, H., McCaffery, B., Mulholland, G., Harkleroad, M. and Mauders, W., "Combustion of Oil On Water," Arctic and Marine Oilspill Program

- (AMOP) Technical Seminar, 9th. Proceedings. June 10-12, 1986, Edmonton, Alberta, Canada, Environment Canada, Ottawa, Ontario, 301-336 pp, 1986. [Evans 86]
- Evans, D., Mulholland, G., Gross, D. and Baum, H., "Environmental Effects of Oil Spill Combustion," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 10th. Proceedings. June 9-11, 1987, Edmonton, Alberta, Canada, Environment Canada, Ottawa, Ontario, 91-130 pp, 1987. [Evans 87]
- Evans, D., Mulholland, G., Gross, D., Baum, H. and Sation, K., "Burning, Smoke Production, and Smoke Dispersion from Oil Spill Combustion," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 11th. Proceedings. June 7-9, 1988, Vancouver, British Columbia, Canada, Environment Canada, Ottawa, Ontario, 41-87 pp, 1988. [Evans_88]
- Evans, D. D., "In-Situ Burning of Oil Spills," Alaska Arctic Offshore Oil Spill Response Technology Workshop Proceedings, NIST SP 762, April 1989, Proceedings, National Institute of Standards and Technology and Minerals Management Service, November 29-December 1, 1988, N.H. Jason editor, Anchorage, AK, 47-95 p, 1989. [Evans_89a]
- Evans, D. D., Baum, H. R., Mulholland, G. W., Bryner, N. P., and Forney, G. P., "Smoke Plumes From Crude Oil Burns," Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, 12th. Proceedings. June 7-9, 1989, Calgary, Canada, 1-22 pp, 1989. [Evans 89b]
- Evans, D. D., Walton, W. D., Baum, H. R., Rehm, R. G., Harris, R. H., Jr., Ghoniem, A., and Holland, J., "Measurement of Large Scale Oil Spill Burns," Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, 13th. Proceedings. June 6-8, 1990, Edmonton, Alberta, Canada, Environment Canada, Ottawa, Ontario, 1-38 pp, 1990. [Evans_90]
- Evans, D. D., Walton, W. D., Baum, H. R., Mulholland, G. W., Lawson, J. R., Koseki, H., and Ghoniem, A., "Smoke Emission From Burning Crude Oil," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 14th. Proceedings. June 12-14, 1991, Vancouver, B.C., Environment Canada, Ottawa, Ontario, 421-449 pp, 1991. [Evans_91]
- Evans, D. D., Walton, W. D., Baum, H. R., Notarianni, K. A., Lawson, J. R., Tang, H. C., Keydel, K. R., Rehm, R. G., Madrzykowski, D., Zile, R. H., Koseki, H., and Tennyson, E. J., "In-Situ Burning of Oil Spills: Mesoscale Experiments," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 15th. Proceedings. June 10-12, 1992, Edmonton, Canada, Environment Canada, Ottawa, Ontario, 593-657 pp, 1992. [Evans_92a]

- Evans, D. D., Walton, W. D., Notarianni, K. A., Baum, H. R. and Koseki, H. "Large Fires: Burning of Oil Spills," U.S./Japan Government Cooperative Program on Natural Resources (UJNR). Fire Research and Safety. 12th Joint Panel Meeting. October 27-November 2, 1992, Tsukuba, Japan, Building Research Inst., Ibaraki, Japan Fire Research Inst., Tokyo, Japan, 365-371 pp, 1992. [Evans_92b]
- Evans, D. D., Walton, W. D., Baum, H. R., Notarianni, K. A., Tennyson, E. J., and Tebeau, P. A., "Mesoscale Experiments Help to Evaluate In-Situ Burning of Oil Spills," Proceedings of the 1993 Oil Spill Conference, API publication No. 4580, American Petroleum Institute, Washington, D.C., 755-760 pp, 1993. [Evans_93]
- Evans, D. D., Madrzykowski, D., and Haynes, G. A., "Flame Heights and Heat Release Rates of 1991 Kuwait Oil Field Fires," International Association for Fire Safety Science, Proceedings 4th International Symposium, June 13-17, 1994, Ottawa, Ontario, 1279-1289 pp, 1994. [Evans_94]
- Evans, D. D., "In Situ Burning of Oil Spills: Smoke Production and Plume Behavior," NIST SP 867, Proceedings, National Institute of Standards and Technology and Minerals Management Service, January 26-28, 1994, Lake Buena Vista, FL, N.J. Jason Editor, 29-37 pp, 1994. [Jason_94]
- Evans, D. D., Mulholland, G. W., Baum, H. R., Walton, W. D., and McGrattan, K. B., "In Situ Burning of Oil Spills," Journal of Research National Institute Standards and Technology, Vol 106, No. 1, 231-278 pp, 2001 [Evans_01]
- Jason, N. H., In Situ Burning Oil Spill Workshop Proceedings, NIST SP 867, Proceedings, National Institute of Standards and Technology and Minerals Management Service, January 26-28, 1994, Lake Buena Vista, FL, N. J. Jason Editor, 101 p, 1994. [Jason_94]
- LaBelle, R. P., Galt, J. A., Tennyson, E. J., and McGrattan, K. B., "1993 Spill Off Tampa Bay, a Candidate for Burning?" Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, 17th. Volume 1. Proceedings. June 8-10, 1994, Vancouver, British Columbia, Environment Canada, Ottawa, Ontario, 635-649 pp, 1994. [LaBelle_94]
- Lawson, J. R., Mulholland, G. W., and Koseki, H., "An Airborne Smoke Sampling Package for Field Measurement of Fires," Fire Technology, Vol. 30, No.1, 155-172 pp, 1994. [Lawson 94]
- Madrzykowski, D. and Evans, D. D., "Large Fires: Kuwait," U.S./Japan Government Cooperative Program on Natural Resources (UJNR), Fire Research and Safety, 12th Joint Panel Meeting, October 27-November 2, 1992, Tsukuba, Japan, Building Research Inst., Ibaraki, Japan Fire Research Inst., Tokyo, Japan, 357-364 pp, 1992. (410 K) [Madrzykowski_92]

- McGrattan, K. B., Putorti, A. D., Jr., Twilley, W. H., and Evans, D. D., Smoke Plume Trajectory From In Situ Burning of Crude Oil in Alaska, NISTIR 5273, 70 p, October 1993. [McGrattan_93]
- McGrattan, K. B., Baum, H. R., and Rehm, R. G., "Smoke Plume Trajectory From In Situ Burning of Crude Oil in Alaska," Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, 17th. Volume 1. Proceedings. June 8-10, 1994, Vancouver, British Columbia, 725-733 pp, 1994. [McGrattan 94]
- McGrattan, K. B., Walton, W. D., Putorti, A. D., Jr., Twilley, W. H., McElroy, J. A., and Evans, D. D., Smoke Plume Trajectory From In Situ Burning of Crude Oil in Alaska: Field Experiments, NISTIR 5764, 40 p, November 1995. [McGrattan_95a]
- McGrattan, K. B., Ferek, R. J., and Uthe, E. E. "Smoke Plume Trajectory From In Situ Burning of Crude Oil: Field Experiments," National Institute of Standards and Technology (NIST) and Society of Fire Protection Engineers (SFPE). International Conference on Fire Research and Engineering (ICFRE). Proceedings, September 10-15, 1995, Orlando, FL, SFPE, Boston, MA, Lund, D. P. and Angell, E. A., Editors, 47-52 pp, 1995. [McGrattan_95b]
- McGrattan, K. B., Walton, W. D., Putorti, A. D., Twilley, W. H., McElroy, J., and Evans, D. D., "Smoke Plume Trajectory From In Situ Burning of Crude Oil in Alaska Field Experiments," Environment Canada. Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 18th. Proceedings. Volume 2. June 14-16, 1995, Edmonton, Alberta, Canada, Environment Canada, Ottawa, Ontario, 901-913 pp, 1995. [McGrattan_95c]
- McGrattan, K. B., Trelles, J. J., Baum, H. R., and Rehm, R. G., Smoke Plume Trajectory Over Two-Dimensional Terrain, NISTIR 5904, October 1996, National Institute of Standards and Technology, Annual Conference on Fire Research: Book of Abstracts, October 28-31, 1996, Gaithersburg, MD, 65-66 pp, 1996. [McGrattan_96]
- McGrattan, K. B., Baum, H. R., Walton, W. D. and Trelles, J. J. Smoke Plume Trajectory From In Situ Burning of Crude Oil in Alaska: Field Experiments and Modeling of Complex Terrain, NISTIR 5958, 135 p. January 1997. [McGrattan_97a]
- McGrattan, K. B., "Smoke Plume Trajectory From In Situ Burning of Crude Oil: Complex Terrain Modeling," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 20th. Volume 2. Proceedings. June 11-13, 1997, Vancouver, British Columbia, Canada, Environment Canada, Ottawa, Ontario, 723-734 pp, 1997. [McGrattan_97b]

McGrattan, K. B., Baum, H. R., and Rehm, R. G., "Smoke Plumes From Large Fires," NISTIR 6030, June 1997. U.S./Japan Government Cooperative Program on Natural Resources (UJNR), Fire Research and Safety, 13th Joint Panel Meeting, Volume 2. March 13-20, 1996, Gaithersburg, MD, Beall, K. A., Editor, 351-360 pp, 1997. [McGrattan_97c]

McGrattan, K. B., Walton, W. D., and Evans, D. D., "Smoke Plumes From In-Situ Burning of Crude Oil," Proceedings of the 1997 Oil Spill Conference, API publication No. 4651, American Petroleum Institute, Washington, D.C., 137-147 pp, 1997. [McGrattan 97d]

McGrattan, K. B., "Smoke Plume Trajectory Modeling," NIST SP 935, February 1999, In Situ Burning of Oil Spills Workshop, Proceedings, National Institute of Standards and Technology and Minerals Management Service, November 2-4, 1998, New Orleans, LA, Walton, W. D. and Jason, N. H., Editors, 75-83 pp, 1999. [Walton 99b]

Mendelssohn, I. A., Hester, M. W., and Pahl, J. W., "Environmental Effects and Effectiveness of in Situ Burning in Wetlands: Considerations for Oil-spill Cleanup," Technical Report Series 169-30-4156, Louisiana Oil Spill Coordinator's Office/Office of the Governor, Louisiana Applied Oil Spill Research and Development Program, Baton Rouge, Louisiana, 53 pp, 1996. [Mendelssohn_96]

Mendelssohon, I. A., Qianxin, L., Carney, K., Bryner, N. P. and Walton, W. D., Coastal Marsh Recovery and Oil Remediation after In-situ Burning: Effects of Water Depth and Burn Duration, National Institute of Standards and Technology, Gaithersburg, MD, 38 p., 2000. [Mendelssohn 00a]

Mendelssohon, I. A., Qianxin, L., Carney, K., Bryner, N. P. and Walton, W. D., Coastal Marsh Recovery and Oil Remediation after In-situ Burning: Effects of Water Depth, Oil and Marsh Type, National Institute of Standards and Technology, Gaithersburg, MD, 54 p., 2000. [Mendelssohn_00b]

Mendelssohon, I. A., Qianxin, L., Carney, K., Bryner, N. P. and Walton, W. D., "Salt Marsh Recovery and Oil Remediation after In-situ Burning: Effects of Water Depth and Burn Duration," Environ. Sci. Technol. 36, pp. 576-581. 2002. [Mendelssohn_02a]

Mendelssohon, I. A., Qianxin, L., Carney, K., Bryner, N. P., Walton, W. D., Twilley, W. H., and Mullin, J. V., "In-Situ Oil Burning in the Marshland Environment - Recovery and Regrowth of the Spartina alterniflora, Spartina patens, and Sagittaria lancifolia Plants," Environment Canada. Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 25th. Proceedings. June 11-13, 2002, Clagary, Canada, Environment Canada, Ottawa, Ontario, 785-807 pp, 2002. [Mendelssohon_02b]

Mulholland, G. W., Liggett, W., and Koseki, H., "The Effect of Pool Diameter on the Properties of Smoke Produced by Crude Oil Fires," Twenty-Sixth Symposium (International) on Combustion/The Combustion Institute, Pittsburgh, PA, 1445-1452 pp, 1996. [Mulholland_96]

Mulholland, G. W., Liggett, W., and Koseki, H., "The Effect of Pool Diameter on the Properties of Smoke Produced by Crude Oil Fires," NISTIR 6030, June 1997. U.S./Japan Government Cooperative Program on Natural Resources (UJNR), Fire Research and Safety, 13th Joint Panel Meeting, Volume 2. March 13-20, 1996, Gaithersburg, MD, Beall, K. A., Editor, 413-422 pp, 1997. [Mulholland_97]

Notarianni, K. A., Evans, D. D., Walton, W. D., and Koseki, H., "Smoke Production from Large Oil Pool Fires," Interflam '93, 6th International Fire Conference, March 30-April 1, 1993, Oxford, England, Interscience Communications Ltd., London, England, Franks, C.A., Editor, 111-119 pp, 1993. [Notarianni_93]

Pfenning, D. and Evans, D., Suppression of Gas Well Blowout Fires Using Water Sprays; Large and Small Scale Studies, Committee of Fire Safety and Safety Protection, Production Session, San Antonio, Texas, September 11-13, American Petroleum Institute, Washington, D.C., 30 p, 1984. [Pfenning_84]

Putorti, A. D., Jr., Evans, D. D., and Tennyson, E. J., "Ignition of Weathered and Emulsified Oils," Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, 17th. Volume 1. Proceedings. June 8-10, 1994, Vancouver, British Columbia, Environment Canada, Ottawa, Ontario, 657-667 pp, 1994. [Putorti_94]

Trelles, J. J., McGrattan, K. B., and Baum, H. R, "Smoke Dispersion From Multiple Fire Plumes," AIAA Journal, Vol. 37, No. 12, 1588-1601, December 1999. [Trelles_94]

Wade, R., Sivathanu, Y. R. and Gore, J. P., A Study of Two Phase High Liquid Loading Jet Fires, National Institute of Standards and Technology, Gaithersburg, MD, NIST-GCR-95-678, 51 p., 1995. [Wade_95]

Walavalkar, A. Y. and Kulkarni, A. K., "Comprehensive Review of Oil Spill Combustion Studies," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 19th. Volume 2. Proceedings. June 12-14, 1996, Calgary, Alberta, Canada, Environment Canada, Ottawa, Ontario, 1081-1103 pp, 1996. [Walavalkar 96]

Walavalkar, A. and Kulkarni, A. K., "Mathematical Model for In-Situ Burning of Water-in-Oil Emulsions," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 20th. Volume 2. Proceedings. June 11-13, 1997, Vancouver, British Columbia, Canada, Environment Canada, Ottawa, Ontario, 809-821 pp, 1997. [Walavalkar 97]

Walavalkar, A. Y. and Kulkarni, A. K., "Combustion of Floating, Water-In-Oil Emulsion Layers Subjected to External Heat Flux," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 23rd. Volume 2. Proceedings. June 14-16, 2000, Vancouver, British Columbia, Canada, Environment Canada, Ottawa, Ontario, 847-856 pp, 2000. [Walavalkar_00]

Walavalkar, A. Y., and Kulkarni, A. K., "Combustion of Mixtures of Weathered Alaskan Crude Oils and Water under External Heat Flux," Environment Canada. Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 24th. Proceedings. June 12-14, 2001, Edmonton, Canada, Environment Canada, Ottawa, Ontario, 755-765 pp, 2001. [Walavalkar_01]

Walton, W. D., Evans, D. D., McGrattan, K. B., Baum, H. R., Twilley, W. H., Madrzykowski, D., Putorti, A. D., Jr., Rehm, R. G., Koseki, H., and Tennyson, E. J., "In Situ Burning of Oil Spills: Mesoscale Experiments and Analysis," Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, 16th. Volume 2. Proceedings. June 7-9, 1993, Calgary, Alberta, Canada, Environment Canada, Ottawa, Ontario, 679-734 pp, 1993. [Walton_93a]

Walton, W. D, In Situ Burning of Oil Spills: Mesoscale Experiments and Analysis, NISTIR 5192, 39 p, September 1993. [Walton_93b]

Walton, W. D., In-Situ Burning of Oil Spills: Mesoscale Experiments, NISTIR 5266, 62 p, November 1993. [Walton_93c]

Walton, W. D., McElroy, J. A., Twilley, W. H., and Hiltabrand, R. R., "Smoke Measurements Using a Helicopter Transported Sampling Package," Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, 17th. Volume 1. Proceedings. June 8-10, 1994, Vancouver, British Columbia, 735-764 pp, 1994. [Walton_94a]

Walton, W. D., Twilley, W. H., McElroy, J. A., Evans, D. D., and Tennyson, E. J., "Smoke Measurements Using a Tethered Miniblimp at the Newfoundland Offshore Oil Burn Experiment," Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, 17th. Volume 2. Proceedings. June 8-10, 1994, Vancouver, British Columbia, Environment Canada, Ottawa, Ontario, 1083-1098 pp, 1994. [Walton_94b]

Walton, W. D., Twilley, W. H., Putorti, A. D., and Hiltabrand, R. R., "Smoke Measurements Using an Advanced Helicopter Transported Sampling Package with Radio Telemetry," Environment Canada. Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 18th. Proceedings. Volume 2. June 14-16, 1995, Edmonton, Alberta, Canada, Environment Canada, Ottawa, Ontario, 1053-1074 pp, 1995. [Walton_95]

- Walton, W. D., McGrattan, K. B., and Mullin, J. V.,"ALOFT-PC: A Smoke Plume Trajectory Model for Personal Computers," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 19th. Volume 2. Proceedings. June 12-14, 1996, Calgary, Alberta, Canada, Environment Canada, Ottawa, Ontario, 987-997 pp, 1996. [Walton_96]
- Walton, W. D., Twilley, W. H., and Mullin, J. V., "Evaluation of Propane as a Fuel for Testing Fire-Resistant Oil Spill Containment Booms," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 20th. Volume 2. Proceedings. June 11-13, 1997, Vancouver, British Columbia, Canada, Environment Canada, Ottawa, Ontario, 755-767 pp, 1997. [Walton_97]
- Walton, W. D., Twilley, W. H., Hiltabrand, R. R., and Mullin, J. V., "Evaluating a Protocol for Testing Fire-Resistant Oil-Spill Containment Boom," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 21st. Volume 2. Proceedings. June 10-12, 1998, Edmonton, Alberta, Canada, Environment Canada, Ottawa, Ontario, 651-671 pp, 1998. [Walton 98]
- Walton, W. D., Twilley, W. H., Bryner, N. P., DeLauter, L. A., Hiltabrand, R. R., and Mullin, J. V., "Second Phase Evaluation of a Protocol for Testing Fire-Resistant Oil Spill Containment Boom," Arctic and Marine Oilspill Program (AMOP) Technical Seminar, 22nd. Volume 2. Proceedings. June 2-4, 1999, Calgary, Alberta, Canada, Environment Canada, Ottawa, Ontario, 447-466 pp, 1999. [Walton_99a]
- Walton, W. D. and Jason, N. H., In Situ Burning of Oil Spills Workshop, NIST SP 935, February 1999, In Situ Burning of Oil Spills Workshop, Proceedings, National Institute of Standards and Technology and Minerals Management Service, November 2-4, 1998, New Orleans, LA, Walton, W. D. and Jason, N. H., Editors, 129 pp, 1999. [Walton 99b]
- Walton, W. D., "Status of Fire Boom Testing," NIST SP 935, February 1999, In Situ Burning of Oil Spills Workshop, Proceedings, National Institute of Standards and Technology and Minerals Management Service, November 2-4, 1998, New Orleans, LA, Walton, W. D. and Jason, N. H., Editors, 31-38 pp, 1999. [Walton 99b]